

## S4D02120E 1200V SIC POWER SCHOTTKY RECTIFIERS



### Description

This 1200V 2A diode is high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The S4D02120E is ideal for energy sensitive, high frequency applications in challenging environments.

### Circuit Diagram



### Features

- 175°C TJ operation
- Ultra-low switching loss
- Switching speeds independent of operating temperature
- Low total conduction losses
- High forward surge current capability
- High package isolation voltage
- Terminals finish: 100% Pure Tin
- "-A" is an AEC-Q101 qualified device
- Pb - Free Device
- All SMC parts are traceable to the wafer lot
- Additional electrical and life testing can be performed upon request

### Applications

- Alternative energy inverters
- Power Factor Correction (PFC)
- Free-Wheeling diodes
- Switching supply output rectification
- Reverse polarity protection

## Maximum Ratings

| Characteristics  | Symbol                          | Condition   | Max. | Units |
|--|---------------------------------|---|------|-------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | -   | 1200 | V     |
| Average Rectified Forward Current  | $I_{F(AV)1}$                    | $T_c=25^{\circ}\text{C}$                            | 9    | A     |
|  | $I_{F(AV)2}$                    | $T_c=160^{\circ}\text{C}$                           | 2    | A     |
| Peak One Cycle Non-Repetitive Surge Current  | $I_{FSM1}$                      | 10ms, Half Sine pulse, $T_c=25^{\circ}\text{C}$     | 27   | A     |
|  | $I_{FSM2}$                      | 10ms, Half Sine pulse, $T_c=110^{\circ}\text{C}$    | 25   | A     |
| Repetitive Peak Forward Surge Current  | $I_{FRM1}$                      | 10ms, Half Sine pulse, $T_c=25^{\circ}\text{C}$     | 16   | A     |
|  | $I_{FRM2}$                      | 10ms, Half Sine pulse, $T_c=110^{\circ}\text{C}$    | 14   | A     |
| Non-Repetitive Peak Forward Surge Current  | $I_{F,Max1}$                    | 10 $\mu\text{s}$ . Pulse, $T_c=25^{\circ}\text{C}$  | 200  | A     |
|  | $I_{F,Max2}$                    | 10 $\mu\text{s}$ . Pulse, $T_c=110^{\circ}\text{C}$ | 160  | A     |
| Power Dissipation  | $P_{tot1}$                      | $T_c=25^{\circ}\text{C}$                            | 62   | W     |
|  | $P_{tot2}$                      | $T_c=110^{\circ}\text{C}$                           | 27   | W     |

## Electrical Characteristics:

| Characteristics           | Symbol   | Condition   | Typ.  | Max. | Units         |
|---------------------------|----------|---|-------|------|---------------|
| Forward Voltage Drop*     | $V_{F1}$ | @ 2A, Pulse, $T_j = 25^{\circ}\text{C}$   | 1.4   | 1.8  | V             |
|                           | $V_{F2}$ | @ 2A, Pulse, $T_j = 175^{\circ}\text{C}$  | 2.0   | 2.5  | V             |
| Reverse Current*          | $I_{R1}$ | @ $V_R = \text{rated } V_R$<br>$T_j = 25^{\circ}\text{C}$   | 1     | 10   | $\mu\text{A}$ |
|                           | $I_{R2}$ | @ $V_R = \text{rated } V_R$<br>$T_j = 175^{\circ}\text{C}$  | 2     | 40   | $\mu\text{A}$ |
| Junction Capacitance      | $C_T$    | $V_R=0\text{V}$ , $T_j=25^{\circ}\text{C}$ , $f=1\text{MHz}$  | 160   | -    | pF            |
| Reverse Recovery Charge   | $Q_c$    | $I_F = 2\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$<br>$V_R = 800\text{V}$ , $T_j = 25^{\circ}\text{C}$ | 12.33 | -    | nC            |
| Capacitance Stored Energy | $E_c$    | $V_R = 800\text{V}$ , $T_j = 25^{\circ}\text{C}$  | 6.33  | -    | $\mu\text{J}$ |

\* Pulse width < 300  $\mu\text{s}$ , duty cycle < 2%

## Thermal-Mechanical Specifications:

| Characteristics                             | Symbol          | Condition    | Specification | Units                       |
|---|-----------------|--------------|---------------|-----------------------------|
| Junction Temperature                        | $T_j$           | -            | -55 to +175   | $^{\circ}\text{C}$          |
| Storage Temperature                         | $T_{stg}$       | -            | -55 to +175   | $^{\circ}\text{C}$          |
| Typical Thermal Resistance Junction to Case | $R_{\theta JC}$ | DC operation | 2.4           | $^{\circ}\text{C}/\text{W}$ |

**Ratings and Characteristics Curves**

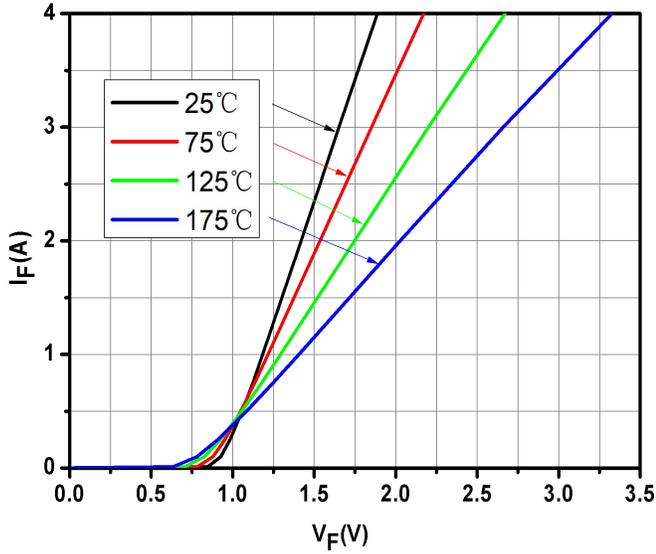


Fig.1-Typical Forward Voltage Characteristics

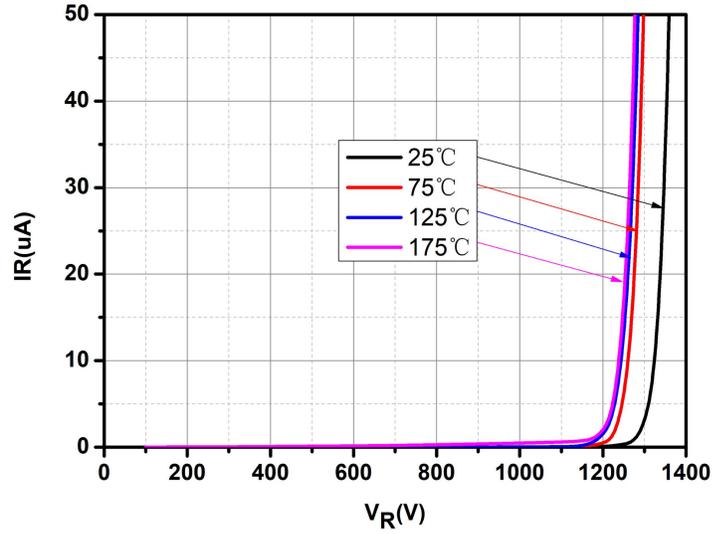


Fig.2-Typical Reverse Characteristics

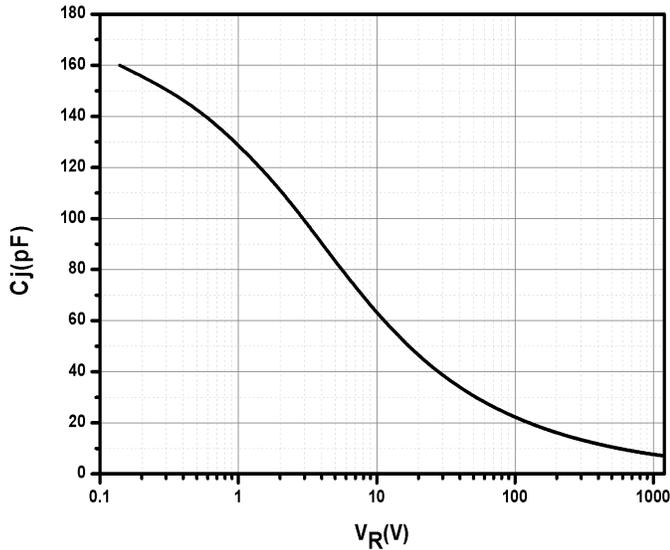


Fig.3-Capacitance vs. Reverse Voltage

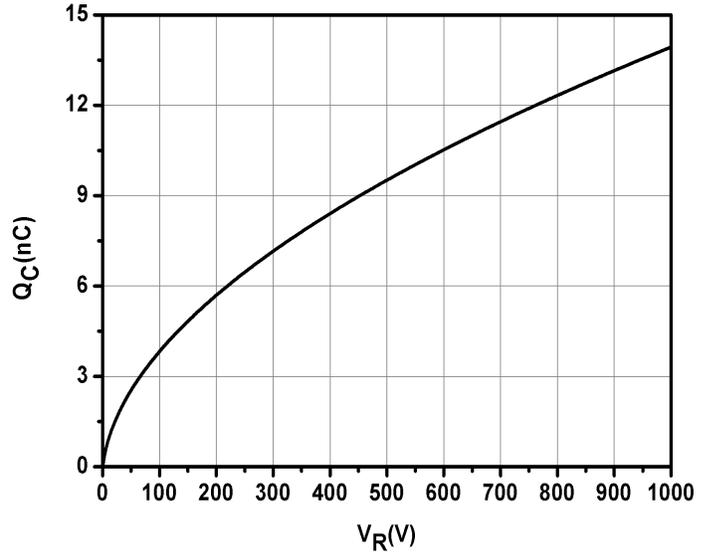


Fig.4-Total Capacitance Charge vs. Reverse Voltage

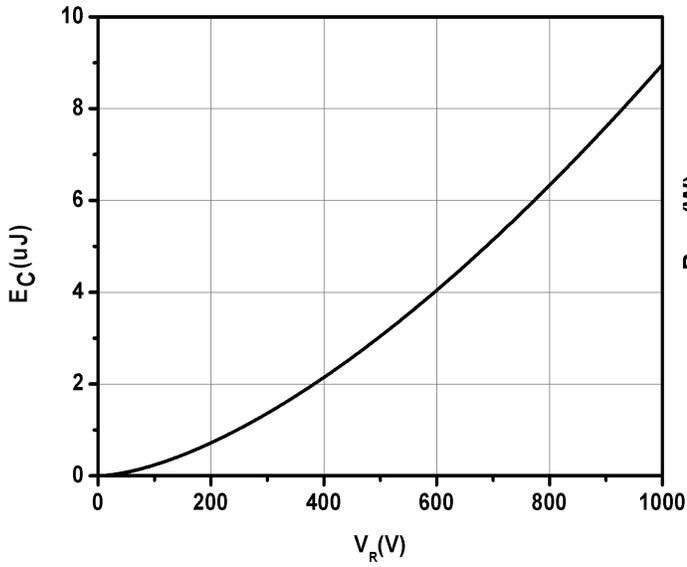


Fig.5-Capacitance Stored Energy

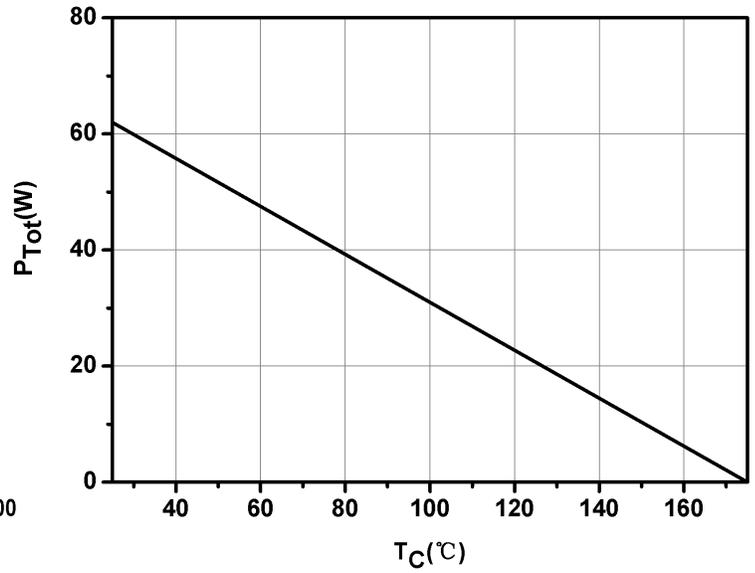


Fig.6-Power Derating

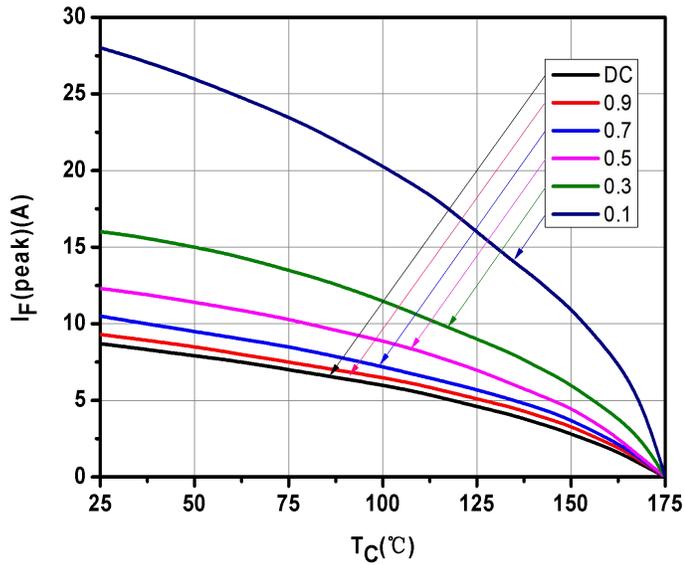


Fig.7-Current Derating

## Ordering Information

| Device      | Package        | Shipping       |
|-------------|----------------|----------------|
| S4D02120E   | DPAK(TO-252-2) | 2500pcs / reel |
| S4D02120ETR | DPAK(TO-252-2) | 2500pcs / reel |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our tape and reel packaging specification.

## Marking Diagram

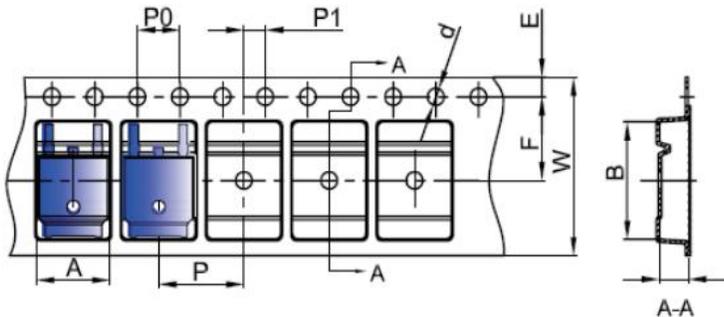


Where XXXXX is YYWWL

S4D = Device Type  
E = Package type  
02 = Forward Current (2A)  
120 = Reverse Voltage (1200V)  
SSG = SSC  
YY = Year  
WW = Week  
L = Lot Number

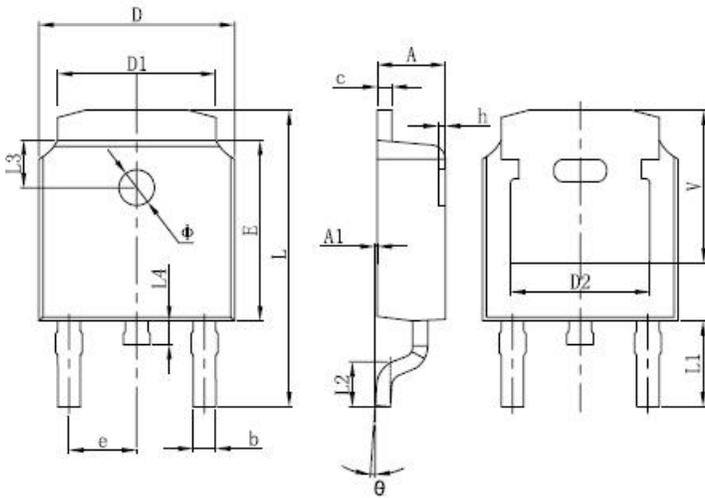
**Cautions :** Molding resin  
Epoxy resin UL : 94V-0

## Carrier Tape & Reel Specification



| SYMBOL | Millimeters |       |
|--------|-------------|-------|
|        | Min.        | Max.  |
| A      | 6.80        | 7.00  |
| B      | 10.40       | 10.60 |
| C      | 2.60        | 2.80  |
| d      | Φ1.45       | Φ1.65 |
| E      | 1.65        | 1.85  |
| F      | 7.40        | 7.60  |
| P0     | 3.90        | 4.10  |
| P      | 7.90        | 8.10  |
| P1     | 1.90        | 2.10  |
| W      | 15.90       | 16.30 |

**Mechanical Dimensions**



| SYMBOL | Dimensions in millimeters |      |       |
|--------|---------------------------|------|-------|
|        | Min.                      | Typ. | Max.  |
| A      | 2.18                      | -    | 2.39  |
| A1     | -                         | -    | 0.13  |
| b      | 0.64                      | -    | 0.89  |
| c      | 0.46                      | -    | 0.89  |
| D      | 6.35                      | -    | 6.73  |
| D1     | 4.95                      | -    | 5.46  |
| D2     | 4.32                      | -    | -     |
| E      | 5.97                      | 6.1  | 6.22  |
| e      | 2.29BSC                   |      |       |
| L      | 9.4                       | -    | 10.41 |
| L1     | 2.90 REF.                 |      |       |
| L2     | 1.4                       | 1.52 | 1.78  |
| L3     | 1.60 REF.                 |      |       |
| L4     | -                         | -    | 1.02  |
| phi    | 1.1                       | -    | 1.3   |
| theta  | 0°                        | -    | 10°   |
| V      | 5.21                      | -    | -     |

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